Review of:

Amendments to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Orchard Runoff into the Sacramento and Feather Rivers

by

David L. Sedlak
Associate Professor
Department of Civil and Environmental Engineering
University of California, Berkeley

My review focused on the draft staff report for the above-referenced project and the appendix detailing the approach used for deriving the load allocations (Appendix A). I also reviewed several of the other supporting documents provided by RWQCB staff.

As part of my review I was asked to address specific questions related to the staff report. Although I have attempted to address these questions, I do not believe that the questions alone constitute a complete peer review of the document. Therefore, I have included most of my detailed comments in a separate section.

Responses to specific questions:

Water Quality Objectives:

1. *Did Cal DFG prepare its hazard assessment criteria in a manner consistent with USEPA guidelines?*

Although I do not have much experience in the finer details of how USEPA guidelines are interpreted, the Cal DFG guidelines appear to be consistent with water quality criteria derived by other scientists using the USEPA guidelines.

2. *Did the report adequately support our conclusions regarding alternative water quality objectives?*

Two other water quality objectives are relevant to this evaluation. The first, which was proposed by Novartis, employs a methodology that is inconsistent with USEPA practice. While the approach of the Novartis expert panel may have some scientific validity, its lack of consistency with existing practice would make it hard to justify. A second, much older water quality objective, 9 ng/L, was proposed by the National Academy of Sciences (NAS) in 1973. One of the supporting documents indicated that the low value was attributable to an overly conservative assumption about acute-to-chronic ratios. However, the NAS study is not mentioned in the body of the staff report.

Water Quality Objectives that Could be Achieved:

1. *Does the report adequately demonstrate that the pest control measures are reasonable?*

This question is outside of my area of expertise and I will defer to other reviewers.

2. *Based on the rationale presented, does the report adequately demonstrate that it is reasonable to expect that water quality objectives can be achieved?*

Although the report concludes that the objectives could be achieved, I believe that there is considerable uncertainty about this issue that needs to be discussed in the report. I also believe that it would be appropriate to compare current loadings with the loadings that would be allowed after the TMDL has been implemented. As it stands, it is very difficult for the reader to understand the changes needed to achieve water quality objectives. See comment 6 for more details.

TMDLs

1. *Does the report adequately support the method for deriving the TMDL?*

In my opinion, the staff has made good progress in establishing a TMDL for diazinon given the uncertainties in the loading and runoff characteristics. However, I have some suggestions and concerns about the TMDL which are articulated in comments 6 and 7.

2. *Does the report adequately support the method for deriving allocations?*

See comments 6 and 7.

Other Comments:

1. General Comment: Overall, the report represents a good synthesis of available data on diazinon and the risks that it poses to the Sacramento and Feather Rivers. I appreciate the way in which the staff members attempted to develop practical and flexible solutions to the problem. However, in several places I found the writing of the report to be confusing. Although this may be attributed to my lack of knowledge about topics such as hydrology and agricultural practices, I believe that any educated scientist should be able to understand a RWQCB staff report. Therefore, I ask the staff members to consider modifying the report to address my comments, even in cases where my lack of knowledge has led to a fundamental misconception. In other words, it may be necessary to translate parts of the document into a form that is more easily understood by a scientifically literate but otherwise uninformed reader.

2. Page 6: History of past actions. As indicated in the discussion of the 1996 lawsuit, diazinon had been linked with chlorpyrifos during the past decade. Previous USGS monitoring studies have shown that the two compounds are important to toxicity in waters of the Central Valley. In addition, the supporting document, "Water Quality Criteria for Diazinon and Chlorpyrifos" states that the two pesticides exhibit additive toxicity by acting on similar systems. Although the dormant season use of chlorpyrifos is only about 6% of the current use of diazinon (B37-B39), it does not necessarily mean that chlorpyrifos concentrations will be negligible, especially if chlropyrifos is used on other crops. As a result, I believe that the

additive effects of the two pesticides should be addressed. This is especially important in light of the statement about additive affects of pesticides on page 24.

3. Page 37: Effect on Production Costs: The current version of the draft reads, "…0% to YY%". I presume that a value will be added here.

4. Page 44: Methods of achieving needed reductions in diazinon releases. The report and associated appendix mention the possible use of vegetated strips to reduce diazinon releases. These strips also will result in reductions in the release of other pesticides and nutrients. Although it might not be possible to take credit for these ancillary reductions in the TMDL, they should be mentioned in the staff report.

5. Page 62: Statement about how diazinon use has peaked. I believe that it is inappropriate to draw any conclusions about future diazinon use based on the period starting in 1990. As indicated in the following paragraphs of the staff report, diazinon use depends on a variety of factors including climate. The period of peak diazinon use (1990-1993) corresponded to the end of a long drought whereas current data represent a period with normal rainfall.

6. Page 65: Load allocations. The hydrologic model yields load allocations in units of grams of diazinon released from orchards per day. I do not understand how this will be translated into concrete recommendations of actions to be taken to comply with the TMDL. As near as I can tell, the variable loading capacity model assumes that diazinon releases will be directly proportional to the amount of diazinon applied in a given area. If this is true, the maximum concentration of diazinon in the river will be related to the amount applied and decreases in application rates will translate into proportional decreases in ambient concentrations.

   Using this logic, it appears that significant decreases in diazinon use will be required to meet the TMDL. For example, the data in Appendix A indicate a peak diazinon concentration of approximately 250 ng/L was observed in 1994, when a total of 44, 827 pounds of diazinon was applied. To meet a water quality objective of 80 ng/L, the diazinon use would have to decrease to approximately 15,000 lbs/yr or about 30% compared to current application rates. While this may be achievable using the approach described in the staff report, it could become more difficult if rainfall patterns or insect populations change significantly.

7. Page 67: Justification for not using the design loading capacity approach: The staff report states, "The primary reason for not selecting the design loading capacity approach is that it does not take into account the dynamic rainfall-runoff process." Although the design capacity approach exhibits this shortcoming, the approach still is attractive because it considers historic trends in flow in the river systems, the frequency at which the objectives will be exceeded and it bases the load allocation on the actual mass leaving the orchards. In my opinion, the advantage of developing a load allocation in units that do not vary with the flow in the river is that it provides a tangible means of evaluating application rates and activities to reduce the amount of diazinon applied.

8. Page A21: Table A.4.1: Minor error-the totals of the mean diazinon use do not sum to the mean values in the table. All entries are low by 2. Also, the table never states the units (lb?).

9. Implementation plan: Although the RWQCB does not want to dictate the methods for achieving the water quality objective, it may be worthwhile to anticipate the possibility of a trading program for diazinon releases. In light of the increasing popularity of such trading programs, it might be worthwhile to discuss how trading would be implemented under this TMDL.